

Remarks

Claims 52-56, 61-65 and 76 are pending in the subject application. By this Amendment, Applicants have added new claims 77 and 78 and canceled claims 55 and 65. Support for the amendments and new claims can be found throughout the subject specification and in the claims as originally filed. With regard to new claims 77 and 78, Applicants note that the recombinant polypeptide has been demonstrated to have an especially high affinity for zinc and an especially large capacity for binding copper as shown in Figure 2; it does not appear that these results could have been expected according to any reference of record. Entry and consideration of the amendments presented herein is respectfully requested. Accordingly, claims 52-54, 56, 61-64 and 76-78 are currently before the Examiner. Favorable consideration of the pending claims is respectfully requested.

As an initial matter, Applicants gratefully acknowledge the Examiner's indication that claims 55 and 65 are free of the prior art.

Submitted herewith is a supplemental Information Disclosure Statement (IDS), accompanied by the form PTO/SB/08, and a copy of the Connolly *et al.* reference listed herein. Applicants request that the reference in the IDS be made of record in the subject application.

Claims 52-54, 56 and 61-64 are rejected under 35 U.S.C. § 103(a) as obvious over Guerinot *et al.* (U.S. Patent No. 5,846,821), in view of Pawlowski *et al.* (1997), and Terry *et al.* (U.S. Patent No. 6,576,816). The Office Action states that it would have been obvious to one of ordinary skill in the art to use the method of transforming plants with an isolated polynucleotide sequence encoding glycine-histidine rich polypeptide to produce a transformed plant having heavy metal accumulating ability as taught by Guerinot *et al.* and to modify that method by incorporating any other known glycine-histidine rich polynucleotide like the AgNt84 cDNA taught by Pawlowski *et al.* to produce transformed plants expressing AgNt84 as a metal binding protein as suggested by Pawlowski *et al.* and use said plants for phytoremediation of heavy metal contaminated sites by first identifying the site; growing the transformed plants expressing the AgNt84 metal binding protein in said contaminated site such that the plants accumulate the metals from the site, and then harvesting the plants to remove the metals from the site with a reasonable expectation of success as taught by Terry *et al.*

In response, Applicants assert that the claimed invention is not obvious over the cited art. A claimed invention is not obvious where the prior art fails to teach a reasonable expectation of success. *See generally KSR Intern. Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). Here, the cited art does not indicate that transgenic plants expressing a generic glycine-histidine rich polypeptide would typically be useful for heavy metal remediation. The Office Action apparently relies on Guerinot *et al.* as teaching the usefulness of generic metal-binding glycine-histidine rich polypeptides to confer metal accumulating ability in transgenic plants; however, Guerinot *et al.* do not appear to teach this. Guerinot *et al.* teach that their polypeptide is a metal transporter that enhances metal accumulation by importing metal into the cell; Guerinot *et al.* do not teach that their protein functions by metal binding *per se*. Indeed, Guerinot *et al.* suggest that the glycine-histidine rich region may play a role as a feedback regulator for inhibiting metal transport; one of skill would recognize that such feedback regulation would tend to reduce metal-accumulating ability rather than enhance it. For example, see column 45, lines 15-25 (histidine-rich region is predicted to be a loop on the cytoplasmic side of the cell membrane) and column 48, lines 15-40 (high cytoplasmic concentrations of metal may bind to the histidine-rich region and reduce the activity of the metal transporter). Thus, while Guerinot *et al.* teach the usefulness of their specific metal transporter proteins, Guerinot *et al.* do not teach that transgenic plants expressing a generic glycine-histidine rich polypeptide would typically be useful for heavy metal remediation.

Indeed, Connolly *et al.* (*Plant Cell*, 2002, 14:1347-1357 and listing Mary Lou Guerinot, one of the inventors of the '821 patent, as senior author) teach that overexpression of metal transporters disclosed in the '821 patent (IRT1) did not confer dominant gain-of-function enhancement of metal uptake in transgenic plants (see Abstract, lines 6-7). Applicants further note that Connolly *et al.* indicate (at page 1355, column 1, last paragraph) that "the targeted overexpression of IRT1 is not sufficient to confer dominant gain-of-function enhancement of metal uptake. It seems that it will not be a straightforward matter to engineer plants that accumulate iron". Thus, it is respectfully submitted that those skilled in the art would not have had a reasonable expectation of success in producing plants capable of accumulating heavy metals from the environment or practicing methods of phytoremediation in view of the state of the art at the time the invention was made. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

Claims 52-54, 56, 61-64 and 76 are rejected under 35 U.S.C. § 103(a) as obvious over Guerinot *et al.* (U.S. Patent No. 5,846,821), in view of Pawlowski *et al.* (1997), and Terry *et al.* (U.S. Patent No. 6,576,816) and further in view of Sharma *et al.* (U.S. Patent No. 5,594,115). As noted above, Guerinot *et al.* do not teach that transgenic plants expressing a generic glycine-histidine rich polypeptide would typically be useful for heavy metal remediation and one of ordinary skill in the art at the time the invention was made would not have had a reasonable expectation of success in making a plant capable of accumulating heavy metals or practicing a method of phytoremediation using such plants in view of the state of the art at the time the invention was made (see arguments presented in the preceding paragraph and Connolly *et al.*, page 1355, column 1, last paragraph). It is further submitted that other cited references (including Sharma *et al.*) also fail to supply suggest that one skilled in the art would have had a reasonable expectation of success in practicing the claimed invention. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

Claims 55 and 65 are rejected under 35 U.S.C. § 112, first paragraph, because the subject specification, while being enabling for a transformed plant comprising an isolated polynucleotide encoding SEQ ID NO: 1, does not reasonably provide enablement for transformed plant comprising a polynucleotide encoding a polypeptide consisting of SEQ ID NO: 4 or a method for phytoremediation metal contaminated sites by growing said plant in said contaminated site. Applicants respectfully assert that the claims as filed are enabled; however, claims 55 and 65 have been canceled. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, first paragraph, is respectfully requested.

It should be understood that the amendments presented herein have been made solely to expedite prosecution of the subject application to completion and should not be construed as an indication of Applicants' agreement with or acquiescence in the Examiner's position. Applicants expressly reserve the right to pursue the invention(s) disclosed in the subject application, including any subject matter canceled or not pursued during prosecution of the subject application, in a related application.

In view of the foregoing remarks and amendments to the claims, Applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account No. 19-0065.

Applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



Frank C. Eisenschenk, Ph.D.

Patent Attorney

Registration No. 45,332

Phone No.: 352-375-8100

Fax No.: 352-372-5800

Address: P.O. Box 142950
Gainesville, FL 32614-2950

FCE/jjc/jb

Attachment: Supplemental Information Disclosure Statement